

## CLAIMS

We claim:

1. A computer-aided-educational method for educating a student on a subject through a computer, which includes a presenter and a non-intrusive sensor, the method comprising the steps of:
  - presenting study materials on the subject to the student through the presenter;
  - monitoring automatically more than once the student's concentration-sensitive behavior through the sensor while the student is studying the materials;
  - analyzing the monitored results based on one or more rules; and
  - providing an indication on the student's concentration level based on the analysis.
2. A computer-aided-educational method as recited in claim 1 wherein for the step of monitoring, more than one type of the student's concentration-sensitive behavior is monitored.
3. A computer-aided-educational method as recited in claim 1 wherein for the step of monitoring, the behavior monitored is of the same type.
4. A computer-aided-educational method as recited in claim 1 wherein the student's behavior is volitional.
5. A computer-aided-educational method as recited in claim 4 wherein the type of behavior includes the student's volitional inputs.
6. A computer-aided-educational method as recited in claim 5 wherein:
  - the sensor monitors the speed of the student's inputs; and
  - one rule is that if the speed of the student's volitional inputs across a predetermined period of time is significantly lower than a reference speed, the student has lost concentration in the study materials.

7. A computer-aided-educational method as recited in claim 6 wherein whether a decrease in speed is significant or not depends on the difficulty level of the study materials.
8. A computer-aided-educational method as recited in claim 5 wherein:  
the study materials are presented in one or more windows of a multi-window environment;  
the study materials reside in at least one of those windows; and  
one rule is that if, for a predetermined amount of time, the student's inputs are not in the one or more windows displaying the study material, the student has lost concentration in the study materials.
9. A computer-aided-educational method as recited in claim 5 wherein:  
the study materials are presented in a window environment with a focus window;  
and  
one rule is that if the study materials are not in the focus window for a predetermined amount of time, the student has lost concentration in the study materials.
10. A computer-aided-educational method as recited in claim 4 wherein the volitional behavior is based on the student's face.
11. A computer-aided-educational method as recited in claim 10 wherein before the step of monitoring, the method comprises the step of calibrating the student's face to generate a reference image.
12. A computer-aided-educational method as recited in claim 10 wherein the behavior includes the student's facial orientation.

13. A computer-aided-educational method as recited in claim 11 wherein one rule is that if results from two consecutive monitoring of the student's face are different from the reference image, the student has lost concentration in the study materials.
14. A computer-aided-educational method as recited in claim 10 wherein the behavior includes the condition of the student's eyes.
15. A computer-aided-educational method as recited in claim 10 wherein the behavior includes the student's facial expression.
16. A computer-aided-educational method as recited in claim 11 wherein:
  - the sensor includes a camera;
  - the presenter includes a monitor; and
  - the step of calibrating includes asking the student to look at the monitor.
17. A computer-aided-educational method as recited in claim 1 wherein the student's behavior monitored is involuntary.
18. A computer-aided-educational method as recited in claim 17 wherein the behavior includes the size of the student's pupils.
19. A computer-aided-educational method as recited in claim 1 further comprising the step of reacting according to the indication provided.
20. A computer-aided-educational method as recited in claim 19 wherein the reaction includes punishing the student for losing concentration in working on the study materials.
21. A computer-aided-educational method as recited in claim 19 wherein the reaction includes stimulating the student to re-focus on the study materials if the student has lost concentration in the study materials.

22. A computer-aided-educational method as recited in claim 21 wherein if the student has worked on the study materials for a pre-determined amount of time, the reaction includes allowing a student to play a game and then resuming back to the study materials.
23. A computer-aided-educational method as recited in claim 19 wherein the reaction includes changing to a different study materials to present to the student.
24. A computer-aided-educational method as recited in claim 19 wherein the reaction includes asking the student a question.
25. A computer-aided-educational method as recited in claim 24 wherein the study materials to be presented to the student depends on the student's response to the question.
26. A computer-aided-educational method as recited in claim 24 wherein the speed of presenting the study materials to the student depends on the student's response to the question.
27. A computer-aided-educational method for educating a student on a subject through a computer, which includes a presenter, the method comprising the steps of:  
presenting study materials on the subject to the student through the presenter;  
asking by the computer, the student a question, when the student is unlikely to expect a question; and  
resuming presenting study materials on the subject to the student through the presenter;  
such that the unexpected nature of the question stimulates the student to enhance the student's concentration level in the study materials.
28. A computer-aided-educational method as recited in claim 27 wherein the student's answer to the question does not affect the study materials resumed to be presented to the student.

29. A computer-aided-educational method as recited in claim 27 wherein:  
the student's answer to the question provides an indication on the student's understanding level in the study materials presented; and  
the difficulty level of the study materials resumed to be presented depends on the indication.
30. A computer-aided-educational method as recited in claim 1 wherein for the step of monitoring, between two consecutive monitoring of the student's concentration-sensitive behavior, the method further comprises the step of analyzing the monitored result based on one or more rules.
31. A computer-aided-education method as recited in claim 1:  
further comprising the step of determining a reference for the student; and  
wherein the step of analyzing includes the step of comparing the student's monitored results with the reference to identify the student's concentration.
32. A computer-aided-education method as recited in claim 31 wherein the reference is a dynamic reference, which incorporates monitored results indicating the student has not lost concentration in the study materials.
33. A computer-aided-educational method as recited in claim 31 further comprising the steps of:  
establishing the student's identity; and  
storing the identity with the reference to be used by the student in the future.
34. A computer-aided-educational system for educating a student on a subject comprising:  
a presenter for presenting study materials on the subject to the student;  
a non-intrusive sensor for monitoring more than once the student's concentration-sensitive behavior while the student is studying the materials;

a controller for analyzing the monitored results based on one or more rules; and  
an indicator for providing an indication on the student's concentration level based  
on the analysis.

35. A computer-aided-educational system as recited in claim 34 wherein the student's  
concentration-sensitive behavior is volitional.

36. A computer-aided-educational system as recited in claim 34 wherein the student's  
behavior is involuntary.

37. A computer-aided-educational system as recited in claim 34 wherein the system  
reacts according to the indication provided by the indicator.